



74H1G66

## SINGLE BILATERAL SWITCH

- HIGH SPEED:  $t_{PD} = 4$  ns (TYP.) at  $V_{CC} = 5V$
- LOW POWER DISSIPATION:  
 $I_{CC} = 1 \mu A$  (MAX.) at  $T_A = 25^\circ C$
- HIGH NOISE IMMUNITY:  
 $V_{NIH} = V_{NIL} = 28\% V_{CC}$  (MIN.)
- LOW "ON" RESISTANCE  
 $R_{ON} = 50\Omega$  (TYP.) AT  $V_{CC}=9V$   $I_{I/O}=100\mu A$
- SINE WAVE DISTORTION  
0.042% (TYP.) AT  $V_{CC}=4V$   $f=1KHz$
- WIDE OPERATING VOLTAGE RANGE:  
 $V_{CC}$  (OPR) = 2V to 12V

### DESCRIPTION

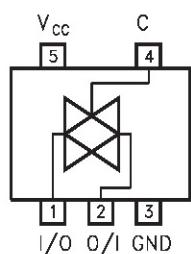
The 74H1G66 is an high-speed CMOS SINGLE BILATERAL SWITCH fabricated in silicon gate  $C^2MOS$  technology. It has high speed



performance combined with true CMOS low power consumption.

The C input is provided to control the switch; the switch is ON when the C input is held high and off when C is held low.

### PIN CONNECTION AND IEC LOGIC SYMBOLS

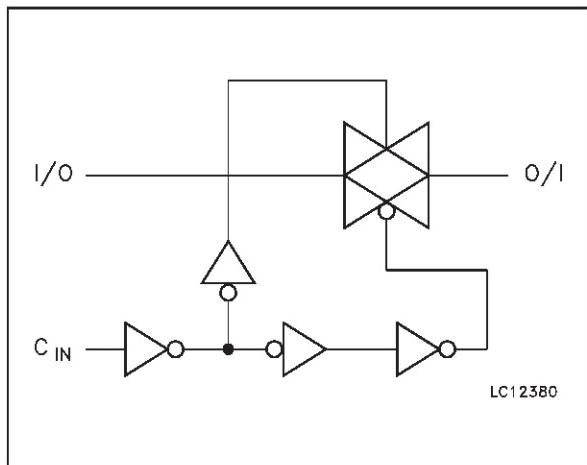


SC12320



LC13690

## LOGIC DIAGRAM



## PIN DESCRIPTION

PIN No	SYMBOL	NAME AND FUNCTION
1	I/O	Independent Input/Output
2	O/I	Independent Output/Input
4	C	Enable Input (Active HIGH)
3	GND	Ground (0V)
5	V <sub>cc</sub>	Positive Supply Voltage

## TRUTH TABLE

CONTROL	SWITCH FUNCTION
H	ON
L	OFF

## ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V <sub>cc</sub>	Supply Voltage	-0.5 to +13	V
V <sub>I</sub>	DC Input Voltage	-0.5 to V <sub>cc</sub> + 0.5	V
V <sub>i/o</sub>	DC Input/Output Voltage	-0.5 to V <sub>cc</sub> + 0.5	V
I <sub>IK</sub>	Control Input DC Diode Current	± 20	mA
I <sub>IOK</sub>	Input/Output DC Diode Current	± 20	mA
I <sub>O</sub>	DC Output Source Sink Current Per Output Pin	± 25	mA
I <sub>CC</sub> or I <sub>GND</sub>	DC V <sub>cc</sub> or Ground Current	± 50	mA
P <sub>D</sub>	Power Dissipation	500 (*)	mW
T <sub>stg</sub>	Storage Temperature	-65 to +150	°C
T <sub>L</sub>	Lead Temperature (10 sec)	300	°C

Absolute Maximum Ratings are those values beyond which damage to the device may occur. Functional operation under these condition is not implied.

(\*) 500mW: ≈ 65 °C derate to 300 mW by 10 mW/°C: 65 °C to 85 °C

## RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Value	Unit
V <sub>CC</sub>	Supply Voltage	2.0 to 12	V
V <sub>I</sub>	Input Voltage (Control)	0 to V <sub>CC</sub>	V
V <sub>i/o</sub>	Input/Output Voltage	0 to V <sub>CC</sub>	V
T <sub>op</sub>	Operating Temperature	-40 to +85	°C
t <sub>r</sub> , t <sub>f</sub>	Input Rise and Fall Time	V <sub>CC</sub> = 2V V <sub>CC</sub> = 4.5V V <sub>CC</sub> = 6V V <sub>CC</sub> = 10V	0 to 1000 ns 0 to 500 ns 0 to 400 ns 0 to 250 ns

## DC SPECIFICATIONS

Symbol	Parameter	Test Conditions		Value					Unit	
		V <sub>CC</sub> (V)		T <sub>A</sub> = 25 °C			-40 to 85 °C			
				Min.	Typ.	Max.	Min.	Max.		
V <sub>IH</sub>	High Level Input Voltage	2.0		1.5			1.5		V	
		4.5		3.15			3.15			
		9.0		6.3			6.3			
		12.0		8.4			8.4			
V <sub>IL</sub>	Low Level Input Voltage	2.0				0.5		0.5	V	
		4.5				1.35		1.35		
		9.0				2.7		2.7		
		12.0				3.6		3.6		
R <sub>ON</sub>	ON Resistance	4.5	V <sub>I</sub> = V <sub>IH</sub> V <sub>I/O</sub> = V <sub>CC</sub> to GND I <sub>I/O</sub> ≤ 1mA		96	170		200	Ω	
		9.0			55	85		100		
		12.0			45	80		90		
		4.5	V <sub>I</sub> = V <sub>IH</sub> V <sub>I/O</sub> = V <sub>CC</sub> or GND I <sub>I/O</sub> ≤ 1mA		70	100		130		
		9.0			50	75		95		
		12.0			45	70		90		
I <sub>OFF</sub>	Input/Output Leakage Current (SWITCH OFF)	12.0	V <sub>O</sub> S = V <sub>CC</sub> to GND V <sub>I</sub> S = V <sub>CC</sub> to GND V <sub>I</sub> = V <sub>IL</sub>			±0.1		±1.0	μA	
I <sub>IZ</sub>	Switch Input Leakage Current (SWITCH ON, OUTPUT OPEN)	12.0	V <sub>O</sub> S = V <sub>CC</sub> to GND V <sub>I</sub> = V <sub>IH</sub>			±0.1		±1.0	μA	
I <sub>IN</sub>	Control Input Current	6.0	V <sub>I</sub> = V <sub>CC</sub> to GND			±0.1		±1.0	μA	
I <sub>CC</sub>	Quiescent Supply Current	6.0	V <sub>I</sub> = V <sub>CC</sub> or GND			1		10	μA	
		9.0				4		40		
		12.0				8		80		

# 74H1G66

## AC ELECTRICAL CHARACTERISTICS ( $C_L = 50 \text{ pF}$ , Input $t_r = t_f = 6 \text{ ns}$ )

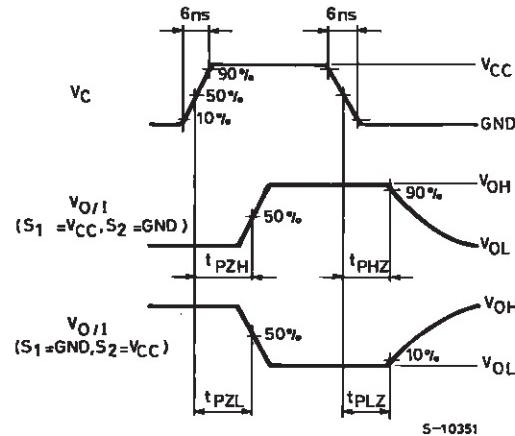
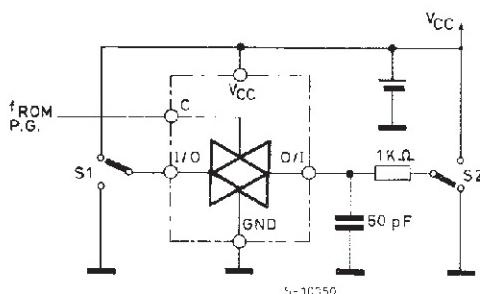
Symbol	Parameter	Test Condition		Value					Unit	
		$V_{CC}$ (V)		$T_A = 25^\circ\text{C}$			$-40 \text{ to } 85^\circ\text{C}$			
				Min.	Typ.	Max.	Min.	Max.		
$\Phi_{IO}$	Phase Difference Between Input and Output	2.0			10	50		65	ns	
		4.5			4	10		15		
		9.0			3	8		13		
		12.0			3	7		10		
$t_{PZL}$ $t_{PZH}$	Output Enable Time	2.0	$R_L = 1 \text{ k}\Omega$		18	100		125	ns	
		4.5			8	20		25		
		9.0			6	12		22		
		12.0			6	12		18		
$t_{PLZ}$ $t_{PHZ}$	Output Disable Time	2.0	$R_L = 1 \text{ k}\Omega$		20	115		145	ns	
		4.5			10	23		29		
		9.0			8	20		25		
		12.0			8	18		22		
	Maximum Control Input Frequency	2.0	$R_L = 1 \text{ k}\Omega$ $C_L = 15 \text{ pF}$ $V_{OUT} = 1/2V_{CC}$		30				MHz	
		4.5			30					
		9.0			30					
		12.0			30					
$C_{IN}$	Input Capacitance				5	10		10	pF	
$C_{I/O}$	Switch Terminal Capacitance				6				pF	
$C_{IOS}$	Feed Through Capacitance				0.5				pF	
$C_{PD}$	Power Dissipation Capacitance (note 1)				15				pF	

1)  $C_{PD}$  is defined as the value of the IC's internal equivalent capacitance which is calculated from the operating current consumption without load. (Refer to Test Circuit). Average operating current can be obtained by the following equation.  $I_{CC(\text{opr})} = C_{PD} \cdot V_{CC} \cdot f_{IN} + I_{CC}$

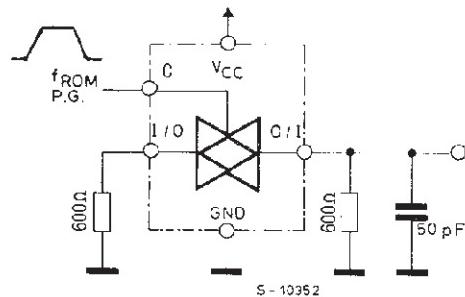
## ANALOG SWITCH CHARACTERISTICS ( $GND = 0 \text{ V}$ , $T_A = 25^\circ\text{C}$ )

Symbol	Parameter	Test Condition			Value	Unit
		$V_{CC}$ (V)	$V_{IN}$ (Vp-p)			
	Sine Wave Distortion (THD)	4.5	4	$f_{IN} = 1 \text{ KHz}$ $R_L = 10 \text{ k}\Omega$ $C_L = 50 \text{ pF}$	0.05	%
		9.0	8		0.04	
$f_{MAX}$	Frequency Response (Switch ON)	4.5	Adjust $f_{IN}$ voltage to Obtain odBm at $V_{OS}$ . Increase $f_{IN}$ Frequency until dB Meter reads -3dB $R_L = 50\Omega$ , $C_L = 10 \text{ pF}$		200	MHz
		9.0			200	
	Feedthrough Attenuation (Switch OFF)	4.5	$V_{IN}$ is centered at $V_{CC}/2$ . Adjust input for 0dBm $R_L = 600\Omega$ , $C_L = 50 \text{ pF}$ , $f_{IN} = 1 \text{ MHz}$ sine wave		-60	dB
		9.0			-60	
	Crosstalk (Control Input to Signal Output)	4.5	$R_L = 600\Omega$ , $C_L = 50 \text{ pF}$ , $f_{IN} = 1 \text{ MHz}$ sine wave ( $t_r = t_f = 6 \text{ ns}$ )		60	mV
		9.0			100	

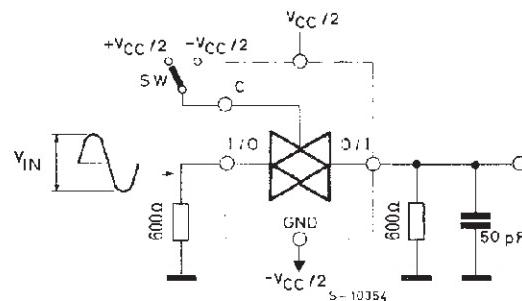
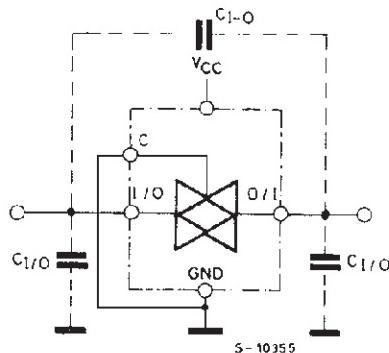
## SWITCHING CHARACTERISTICS TEST CIRCUIT

 $t_{PLZ}$ ,  $t_{PHZ}$ ,  $t_{PZL}$ ,  $t_{PZH}$ .

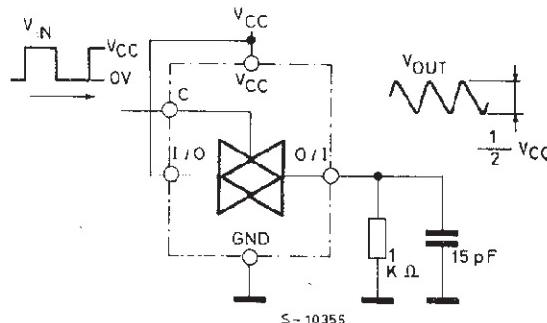
## CROSSTALK (control to output)



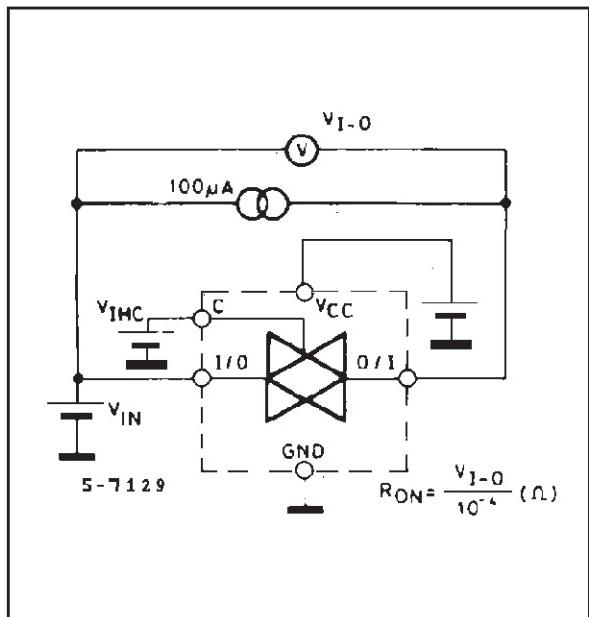
## BANDWIDTH AND FEEDTHROUGH ATTENUATION

GND (V<sub>SS</sub>)C<sub>I-O</sub> C<sub>I/O</sub>GND (V<sub>SS</sub>)

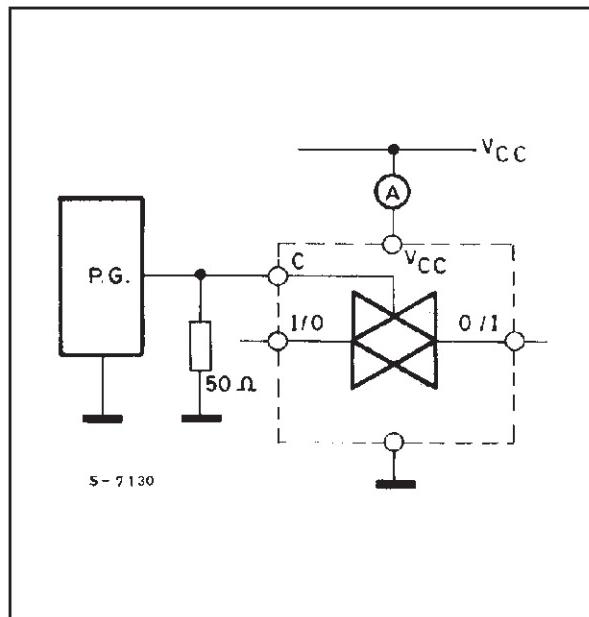
## MAXIMUM CONTROL FREQUENCY



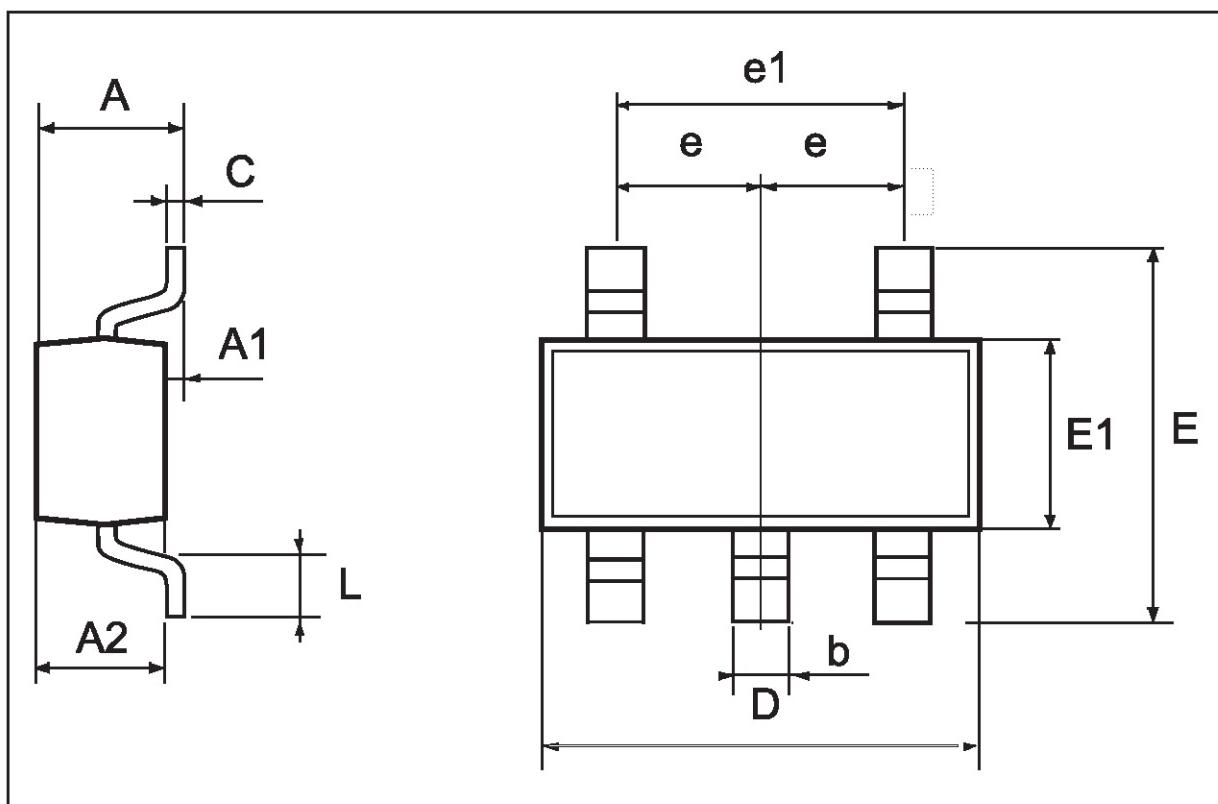
**CHANNEL RESISTANCE ( $R_{ON}$ )**



**$I_{cc}$  (Opr.)**



SOT23-5L MECHANICAL DATA						
DIM.	mm			mils		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	0.90		1.45	35.4		57.1
A1	0.00		0.15	0.0		5.9
A2	0.90		1.30	35.4		51.2
b	0.35		0.50	13.7		19.7
C	0.09		0.20	3.5		7.8
D	2.80		3.00	110.2		118.1
E	2.60		3.00	102.3		118.1
E1	1.50		1.75	59.0		68.8
L	0.35		0.55	13.7		21.6
e		0.95			37.4	
e1		1.9			74.8	



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